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EXAMINER

NGUYEN, LUONG TRUNG

ART UNIT	PAPER NUMBER
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2622

NOTIFICATION DATE	DELIVERY MODE
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02/22/2008

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary

Application No.

10/796,148

Applicant(s)

SHIZUKUISHI, MAKOTO

Examiner

LUONG T. NGUYEN

Art Unit

2622

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 December 2007.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) 3-5, 7, 13, 15 and 18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 6, 8-12, 14, 16, 17 and 19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 03/04; 11/07.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Species VIII, illustrated in Figures 45-48, which reads on claims 1, 2, 6, 8-12, 14, 16, 17 and 19 in the reply filed on 12/10/2007 is acknowledged.
2. Claims 3-5, 7, 13, 15, 18 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 12/10/2007.

Priority

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

4. The drawings are objected to because of the following informalities:
In Figure 31B, the arrow labeled "G" points to layer 118 should be changed to --R--;
the arrow labeled "R" points to magenta filter 152 should be changed to --G--.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet,

even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

5. Claims 1, 2, 6, 8-12, 14, 16, 17 and 19 are objected to because of the following informalities:

Claim 1 (line 8), "the three primary colors" should be changed to --three primary colors--.

Claim 9 (line 4), "a heavily-doped" should be changed to --the heavily-doped--.

Claim 9 (line 4), "a doping level" should be changed to --the doping level--.

Claims 2, 6, 8-12, 14, 16, 17 and 19 are objected as being dependent on claim 1.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 2, 6, 10, 12, 14, 16, 17, 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Tabei (US 4,514,755).

Regarding claims 1, 14, Tabei discloses a color solid-state image pickup device (imager, figure 6, column 9, lines 54-68) comprising:

a plurality of light-receiving sections (imager, figure 6, column 9, lines 54-68) being arranged on the surface of a semiconductor substrate in a two-dimensional array;

complementary color filters which are stacked on all or portions of the plurality of light-receiving sections, each complementary color filter blocking incident light of one color of the three primary colors, to thereby permit transmission of incident light of remaining two colors of the three primary colors (figures 7-10, 11a-11d, Y-filter blocks blue color and permits transmission of red and green light, column 11, lines 4-61);

at least first and second color signal detecting layers (layers 103, 104, figures 7-10, 11a-11d, column 11, lines 4-61) which have the complementary color filters stacked thereon and are formed so as to be separated in a depthwise direction of the light-receiving section, the first signal detecting layer detecting a color signal of one color of the light of two colors having passed through the complementary color filters, and the second signal detecting layer detecting a color signal of remaining one color of the light of two colors having passed through the complementary color filters;

a signal reading unit (inherently included in the solid-state color imager, figures 6-11d) for reading the respective color signals in a distinguished manner, the signal reading unit being connected to the respective color signal detecting layers.

Regarding claim 2, Tabei discloses wherein a color signal of one color being different from two colors of the three primary colors, the two colors being detected by a first light receiving section with the complementary color filter stacked thereon, is determined by subjecting, to interpolation processing, at least one detection signal detected by at least one second light-receiving section which is provided around the first light-receiving section and, at least, detects the color signal of the-one color being different from the two colors detected by the first light-receiving section (figures 6-10, 11a-11d, column 11, lines 4-61).

Regarding claim 6, Tabei discloses wherein two types of light-receiving sections are arranged on the surface of the semiconductor substrate, that is, the light-receiving section with a magenta filter, stacked thereon, and the light-receiving section on which a transparent planarized film is stacked in place of a color filter (M-filter and a transparent film are stacked on the light receiving portion, figures 11b-c).

Regarding claim 10, Tabei discloses wherein the depth of the first color signal detecting layer and the depth of the second color signal detecting layer are set in accordance with

respective wavelengths of the light of two colors having passed through the complementary color filters (figures 11a-11d, column 11, lines 20-42).

Regarding claim 12, Tabei discloses wherein the light-receiving sections are arranged in a square solid pattern on the surface of the semiconductor substrate (figure 6).

Regarding claim 16, Tabei discloses the signal reading unit is a signal line (a signal line is inherently included in the solid-state color imager for reading out image signal).

Regarding claim 17, Tabei discloses wherein the light-receiving sections store electric charges in a PN junction section (p-n diodes, column 2, lines 34-56) formed as a result of provision of heavily-doped impurity layers serving as the color signal detecting layers, in the semiconductor substrate; the electric charges are caused to discharge by means of photocarriers produced by incident light ; and the quantity of change in electric charges, which varies by means of electric discharge, is read as the color signal (when light strikes the photosensitive layers, light of particular color is detected, see abstract, figures 7-11d, for example, when light reaches to layer 104, green color is detected and read out; when light reaches layer 103, red color is detected and read out, figure 11a, column 11, lines 4-42).

Regarding claim 19, Tabei discloses wherein an impurity region which is superimposed on the heavily-doped impurity layer for detecting a blue (B) color signal and establishes ohmic contact between the heavily-doped impurity layer and the signal line is formed deeper than the heavily-doped impurity layer (since Tabei discloses in figure 11b that when light reaches layer 104, blue color is detected and read out, an impurity region which is superimposed on the heavily-doped impurity layer and ohmic contact are inherently included in layer 104 for detecting blue color).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tabei (US 4,514,755) in view of Merrill (US 7,132,724).

Regarding claim 8, Tabei fails to disclose wherein an electric charge path formed from a heavily-doped impurity region, the region extending continuously up to the surface of the semiconductor substrate, is provided in a color signal detecting layer provided in the semiconductor substrate from among the color signal detecting layers. However, Merrill discloses an electric charge path formed from a heavily-doped impurity region, the region extending continuously up to the surface of the semiconductor substrate, is provided in a color

signal detecting layer provided in the semiconductor substrate from among the color signal detecting layers (region 134 provides access to red detector layer 116, region 136 provides access to green detector layer 126, figure 9, column 8, line 8 – column 9, line 21). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Tabei by the teaching of Merrill in order to provide a complete-charge transfer vertical-color-filter detectors which has advantage of minimizing or eliminating the need for interpolation as require by the Bayer patterns since each pixel location in the array measures three spectral components at the same location (column 4, line 64 - column 5, line 1).

Regarding claim 9, Merrill discloses wherein a concentration gradient is set such that a doping level of the color signal detecting layer formed as a heavily-doped impurity region and a doping level of the electric charge path continually connected to the color signal detecting layer increase as the layer and the path approach the signal reading unit (figure 9, column 8, lines 8-67).

10. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tabei (US 4,514,755) in view of Stavely (US 6,535,249).

Regarding claim 11, Tabei fails to disclose wherein on-chip light gathering optical systems are provided on upper portions of the respective light-receiving sections, and one opening of each light-shielding film corresponds to each of the light-receiving sections. However, Stavely teaches a digital camera optical system which comprises microlens 468 is mounted on the upper portion of electronic sensor 416 for gathering image light 422 and focuses

it onto the smaller width 488 of the light sensitive region 454 via an opening of light shields 440,446, figure 8, column 5, lines 40-65). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Tabei by the teaching of Stavely in order to focus and direct image light toward the pixels in an electronic sensor (column 3, lines 18-20).

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Park et al. (US 5,877,040) discloses method of making charge-coupled device with microlens.

Hopper et al. (US 6,924,167) discloses method of forming a bandgap tuned vertical color image cell.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LUONG T. NGUYEN whose telephone number is (571) 272-7315. The examiner can normally be reached on 7:30AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DAVID L. OMETZ can be reached on (571) 272-7593. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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LN
02/14/08

Luong T. Nguyen

LUONG T. NGUYEN
PATENT EXAMINER